Munich Cancer Registry

- Survival
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- *Deutsch*

Munich Cancer Registry at Munich Cancer Center
Marchioninistr. 15
Munich, 81377
Germany

http://www.tumorregister-muenchen.de/en

Cancer statistics: Baseline statistics

C23-C24: Gallbladder cancer

Year of diagnosis	1998-2013
Patients	3,285
Diseases	3,290
Creation date	05/19/2015
Export date	12/30/2014
Population	4.64 m

http://www.tumorregister-muenchen.de/en/facts/base/base_C2324E.pdf

Global Statements about the statistics on the Internet −
Baseline Statistics (grey button), **Survival** (red button)

In these analyses, the clinics and physicians of Upper Bavaria and the city and county of Landshut[#], with a total of 4.64 million inhabitants, account for the frequency of cancer diseases[##] and the achieved long term results. Additionally, the long term survival evaluated by the Munich Cancer Registry (MCR) is compared with the results of the population-based registry in the USA (SEER), which is useful for checking the consistency of the data on an international level.

In comparing several tables, inconsistent figures may be detected. This is based on the fact that different patient cohorts are included in the base calculation, for example when proportions of multiple tumors or DCO-cases[###] are concerned. In other cases the individual tumor diagnosis is the basis for calculation, for example with incidence.

The foot notes describe the currentness of the data. The baseline statistics and survival data are updated annually. This yearly analysis comprises the Annual Report of the MCR. The time-delayed acquisition of data and the occasionally high DCO-rates indicate optimizing reserves, among others, because of current financial and legal conditions that hinder the analyses.

Clinics and physicians have access to essentially more detailed data, with which they can check, compare and in the best case optimize their own data and results.

We would be pleased to receive corrections, critique and useful suggestions. Just send an e-mail to tumor@ibe.med.uni-muenchen.de.

Munich Cancer Registry, May 2015

[#] Base data has been collected since 1998. An increase in new diseases is apparent, which is an effect of two extensions in the MCR catchment area (from a base population of 2.51 million to 3.96 in 2002, and to 4.52 million in 2007). Death certificates from 2014 are incorporated into these analyses.

[##] Due to the high frequency and good prognosis of non-malignant skin cancer (C44), no systematic ascertainment is performed for this diagnosis. C44 is not designated as a primary, but rather as a secondary tumor.

[###] DCO (death certificate only) identifies a cancer case that first becomes available to the MCR through the death certificate. A high proportion of DCO cases (≥5%) in particular cancer types indicate insufficient participation of specific cancer specializations.

ICD-10 codes (ICD-10 2015) used for specifying cancer site

Code	Description
C23	Malignant neoplasm of gallbladder
C24.-	Malignant neoplasm of other and unspecified parts of biliary tract
C24.0	Extrahepatic bile duct
C24.1	Ampulla of Vater
C24.8	Overlapping lesion of biliary tract
C24.9	Biliary tract, unspecified

INCIDENCE

Table 1

Patient cohorts by year of diagnosis including DCO cases and multiple primaries, and with proportion of deaths and active follow-up

Year of diagnosis	Cases n	DCO cases n	Prop. DCO %	Prop. mult. primaries %	Prop. deaths %	Prop. actively followed %	
1998	106	24	22.6	8.5	91.5	100.0	
1999	114	17	14.9	20.2	95.6	100.0	
2000	114	27	23.7	12.3	96.5	100.0	
2001	126	40	31.7	11.1	91.3	97.6	
2002	237	80	33.8	17.7	95.4	100.0	#
2003	229	72	31.4	12.2	93.9	99.6	
2004	232	60	25.9	13.4	87.9	97.0	
2005	212	58	27.4	17.5	88.7	98.1	
2006	250	54	21.6	19.2	90.0	98.0	
2007	259	47	18.1	20.8	91.1	96.1	# ##
2008	261	60	23.0	21.1	87.4	91.2	
2009	255	41	16.1	16.9	83.9	87.5	
2010	235	43	18.3	20.4	82.1	89.4	
2011	243	35	14.4	23.5	81.9	88.1	
2012	243	29	11.9	23.0	73.3	88.5	
2013	174	43	24.7	23.0	52.3	98.9	###
1998-2013	3290	730	22.2	18.2	86.0	94.9	

\# The increases of incident cases in 2002 and 2007 reflect the expansion to additional registry areas.

Since 2007 the percentage of actively followed patients sharply declined compared to the previous years. This is a consequence of ambiguous data protection rules that currently forbid cancer registries in Bavaria to obtain the essential life status informations from competent registration offices.

Please be aware that data of recent annual patient cohorts may not yet be fully processed. Therefore, the presented figures and tables are potentially related to different time periods as pointed out in the respective headlines or legends.

Table 1a

Patient cohorts by year of diagnosis and gender
including DCO cases

Year of diagnosis	All n	Males n	Females n	Prop. males %
1998	106	37	69	34.9
1999	114	45	69	39.5
2000	114	53	61	46.5
2001	126	48	78	38.1
2002	237	103	134	43.5
2003	229	91	138	39.7
2004	232	82	150	35.3
2005	212	91	121	42.9
2006	250	97	153	38.8
2007	259	104	155	40.2
2008	261	123	138	47.1
2009	255	125	130	49.0
2010	235	104	131	44.3
2011	243	118	125	48.6
2012	243	111	132	45.7
2013	174	79	95	45.4
1998-2013	3290	1411	1879	42.9

Table 2

Incidence measures by year of diagnosis and gender including DCO cases
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002,
and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Males n	Females n	Males Inc. raw	Fem. Inc. raw	Males Inc. WS	Fem. Inc. WS	Males Inc. ES	Fem. Inc. ES	Males Inc. BRD-S	Fem. Inc. BRD-S
1998	37	69	3.3	5.9	1.9	2.5	3.1	3.7	4.5	4.7
1999	45	69	4.0	5.8	2.3	2.3	3.6	3.6	4.6	4.9
2000	53	61	4.7	5.1	2.7	1.6	4.1	2.7	5.6	4.1
2001	48	78	4.1	6.4	2.3	2.6	3.7	4.0	5.2	5.4
2002	103	134	5.5	6.8	3.1	2.3	4.7	3.8	6.0	5.4
2003	91	138	4.9	7.0	2.6	2.5	4.0	3.9	5.4	5.5
2004	82	150	4.4	7.6	2.4	2.8	3.6	4.3	4.7	5.8
2005	91	121	4.8	6.1	2.5	2.3	3.8	3.5	4.9	4.7
2006	97	153	5.1	7.6	2.6	2.5	3.9	4.1	5.1	5.6
2007	104	155	4.7	6.7	2.6	2.5	3.7	3.9	4.7	5.2
2008	123	138	5.5	5.9	2.6	2.1	4.1	3.2	5.6	4.3
2009	125	130	5.6	5.6	2.7	2.0	4.1	3.1	5.5	4.1
2010	104	131	4.6	5.6	2.2	2.0	3.4	3.1	4.5	4.2
2011	118	125	5.2	5.3	2.4	1.8	3.7	2.9	5.1	3.8
2012	111	132	4.9	5.6	2.2	2.0	3.4	3.1	4.6	4.2
2013	79	95	3.5	4.0	1.5	1.4	2.3	2.2	3.3	2.9
1998-2013	1411	1879	4.7	6.0	2.4	2.2	3.7	3.4	4.9	4.6

The computation of the incidence measures includes all primaries, irrespective of first or subsequent malignancy.

Table 3

Age distribution parameters by year of diagnosis (All)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	106	73.2	12.7	28.5	99.5	55.5	64.8	74.7	82.6	88.8
1999	114	72.2	12.3	35.3	96.5	56.5	66.8	73.2	79.5	87.0
2000	114	74.9	11.0	44.5	94.0	60.0	66.8	76.2	82.2	88.7
2001	126	72.9	12.0	40.2	99.1	56.5	65.3	75.2	81.5	88.0
2002	237	73.7	11.6	34.1	94.5	57.8	65.9	74.6	82.1	88.1
2003	229	74.3	10.3	37.2	96.8	60.0	66.8	75.0	81.9	87.3
2004	232	73.7	11.8	34.0	100	57.0	67.1	74.2	82.7	88.0
2005	212	72.7	11.6	44.5	98.0	57.5	63.9	72.1	81.8	86.8
2006	250	74.4	12.0	36.7	99.2	58.0	67.4	74.9	83.6	89.0
2007	259	71.9	12.0	35.2	97.1	55.8	64.5	72.4	80.3	87.0
2008	261	74.0	11.6	32.9	99.3	59.2	67.6	74.6	83.0	87.2
2009	255	73.1	11.9	26.5	97.7	56.0	67.0	73.8	81.6	87.7
2010	235	73.0	11.2	43.5	93.8	58.2	65.7	74.2	81.7	87.2
2011	243	73.9	11.4	36.1	100	58.6	66.2	75.1	83.0	87.9
2012	243	73.6	10.5	29.3	99.8	61.3	67.2	74.3	80.4	87.4
2013	174	75.0	9.8	48.6	96.2	60.7	70.0	75.4	81.5	87.4
1998-2013	3290	73.5	11.5	26.5	100	58.1	66.4	74.4	82.0	87.6

Table 3a

Age distribution parameters by year of diagnosis (MALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	37	71.9	10.5	51.0	88.9	55.5	62.2	74.7	79.2	83.6
1999	45	68.1	13.0	35.3	89.8	54.1	59.2	68.7	77.5	86.0
2000	53	71.6	12.1	44.5	94.0	56.4	62.3	72.5	80.5	86.0
2001	48	71.9	11.6	42.1	92.8	56.5	63.0	73.4	79.6	88.0
2002	103	70.3	10.3	44.7	93.5	58.1	62.9	70.0	77.7	85.2
2003	91	72.1	9.7	52.5	95.2	58.9	63.9	72.0	79.7	84.8
2004	82	69.9	11.4	34.0	91.5	54.2	63.9	71.1	76.7	83.7
2005	91	70.0	11.1	47.0	98.0	57.0	63.0	69.4	78.9	86.0
2006	97	69.9	12.0	36.7	94.5	53.8	62.5	69.6	78.3	84.2
2007	104	67.9	11.3	35.2	93.1	53.7	61.4	66.5	76.2	82.6
2008	123	72.3	10.4	37.0	93.1	59.2	65.7	72.6	80.6	84.6
2009	125	71.5	11.3	43.3	97.7	53.4	64.9	72.2	80.0	84.6
2010	104	71.2	10.4	43.5	93.7	58.0	64.2	72.8	78.4	84.2
2011	118	71.6	10.9	38.9	92.1	56.4	65.2	73.7	79.4	84.0
2012	111	71.7	9.4	49.8	93.5	58.4	64.8	72.5	77.6	83.4
2013	79	74.4	9.4	48.6	93.8	60.7	69.1	75.2	80.6	85.6
1998-2013	1411	71.0	10.9	34.0	98.0	56.8	63.8	71.7	79.1	84.6

Table 3b

Age distribution parameters by year of diagnosis (FEMALES)
(incl. DCO)

Year of diagnosis	Cases n	Mean	Std. dev.	Min.	Max.	10%	25%	Median 50%	75%	90%
1998	69	73.9	13.7	28.5	99.5	54.5	65.8	75.2	84.5	90.1
1999	69	75.0	11.0	43.7	96.5	61.6	69.6	75.8	81.9	90.1
2000	61	77.9	9.1	51.1	92.4	66.4	74.0	78.3	82.5	89.7
2001	78	73.5	12.3	40.2	99.1	54.9	65.7	76.0	81.9	88.4
2002	134	76.4	11.8	34.1	94.5	57.8	71.9	79.2	83.6	89.7
2003	138	75.7	10.5	37.2	96.8	61.8	68.1	77.2	83.0	88.1
2004	150	75.7	11.6	44.2	100	60.0	68.5	76.7	84.0	90.1
2005	121	74.7	11.7	44.5	98.0	59.4	65.3	76.5	82.8	89.3
2006	153	77.2	11.1	43.2	99.2	64.8	71.2	78.5	85.7	91.2
2007	155	74.6	11.7	39.2	97.1	57.9	67.9	75.6	83.0	89.2
2008	138	75.4	12.4	32.9	99.3	59.1	68.9	77.9	84.7	88.1
2009	130	74.7	12.4	26.5	96.6	60.1	67.9	76.3	84.0	88.3
2010	131	74.5	11.6	45.3	93.8	59.0	67.2	75.4	83.6	88.8
2011	125	76.1	11.4	36.1	100	61.1	69.4	76.3	85.2	89.4
2012	132	75.1	11.2	29.3	99.8	62.9	68.7	76.4	82.4	89.4
2013	95	75.6	10.2	50.5	96.2	60.1	70.8	75.4	82.3	88.3
1998-2013	1879	75.4	11.5	26.5	100	59.9	68.8	76.7	83.8	89.2

Table 4

Age distribution by 5-year age group and gender for period 1998-2013 (incl. DCO)

Age at diagnosis Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
25-29	3	0.1	0.1			0.0	3	0.2	0.2
30-34	4	0.1	0.2	1	0.1	0.1	3	0.2	0.3
35-39	12	0.4	0.6	7	0.5	0.6	5	0.3	0.6
40-44	24	0.7	1.3	11	0.8	1.3	13	0.7	1.3
45-49	63	1.9	3.2	29	2.1	3.4	34	1.8	3.1
50-54	122	3.7	6.9	63	4.5	7.9	59	3.1	6.2
55-59	180	5.5	12.4	108	7.7	15.5	72	3.8	10.1
60-64	308	9.4	21.8	179	12.7	28.2	129	6.9	16.9
65-69	454	13.8	35.6	233	16.5	44.7	221	11.8	28.7
70-74	541	16.4	52.0	246	17.4	62.2	295	15.7	44.4
75-79	546	16.6	68.6	228	16.2	78.3	318	16.9	61.3
80-84	503	15.3	83.9	173	12.3	90.6	330	17.6	78.9
85+	530	16.1	100.0	133	9.4	100.0	397	21.1	100.0
All ages	3290	100.0		1411	100.0		1879	100.0	

Included in the statistics are 23.4% multiple primaries in males and 20.1% in females.

Table 5

Age-specific incidence, DCO rate and proportion of all cancers
for period 1998-2013

Age at diagnosis Years	Males n	Females n	Males Age-spec. incid.	Females Age-spec. incid.	Males DCO rate n=240 %	Females DCO rate n=489 %	Males Prop.all cancers n=158258 %	Females Prop.all cancers n=153136 %
0- 4			0.0	0.0				
5- 9			0.0	0.0				
10-14			0.0	0.0				
15-19			0.0	0.0				
20-24			0.0	0.0				
25-29		3	0.0	0.1				0.3
30-34	1	3	0.0	0.1			0.1	0.1
35-39	7	5	0.3	0.2		40.0	0.3	0.1
40-44	11	13	0.4	0.5		7.7	0.3	0.2
45-49	29	34	1.2	1.5		8.8	0.5	0.4
50-54	63	59	3.1	2.9	11.1	6.8	0.7	0.5
55-59	108	72	5.9	3.7	4.6	12.5	0.7	0.5
60-64	179	129	10.1	6.9	6.7	9.3	0.8	0.7
65-69	233	221	14.8	12.8	11.2	7.7	0.8	1.2
70-74	246	294	19.2	19.4	16.3	12.6	0.9	1.6
75-79	228	317	27.6	26.7	18.4	24.3	1.1	1.8
80-84	173	330	34.6	35.4	28.3	35.8	1.3	2.1
85+	132	397	38.7	44.4	44.7	52.6	1.3	2.3
All ages	1410	1877			17.0	26.1	0.9	1.2
Incidence								
Raw			4.7	6.0				
WS			2.4	2.2				
ES			3.7	3.4				
BRD-S			4.9	4.6				

The age-specific incidence characterizes the disease risk in a particular age group. The age distribution depends on the patient population frequency in each age group and reflects the tangible clinical picture of everyday patients care (see following chart).

Table 6a

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
MALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C15	Oesophagus	2	0.4	4.7	0.6	16.9		11.4	
C16	Stomach	4	1.1	3.8	1.0	9.7	#	21.3	25.0
C17	Small intestine	2	0.1	17.3	2.1	62.4	#	13.6	
C18	Colon	7	2.5	2.8	1.1	5.8	#	32.6	28.6
C22	Liver	3	0.7	4.4	0.9	13.0		16.8	
C25	Pancreas	3	0.9	3.4	0.7	9.9		15.3	33.3
C33-C34	Lung	3	2.9	1.0	0.2	3.0		0.8	
C43	Malign. melanoma	4	0.9	4.2	1.2	10.8	#	22.1	
C61	Prostate	10	7.5	1.3	0.6	2.4		18.0	20.0
C67	Bladder	2	1.1	1.8	0.2	6.5		6.4	
C82-C85	NHL	2	1.0	2.0	0.2	7.4		7.4	50.0
Other primaries		4	2.5	1.6	0.4	4.1		10.8	50.0
Not observed		0	3.5	0.0	0.0	1.0		-25.5	
All mult. primaries		46	25.1	1.8	1.3	2.4	#	150.9	19.6

Patients	836
Median age at second malignancy (years)	71.9
Person-years	1383
Mean observation time (years)	1.7
Median observation time (years)	0.8

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

Table 6b

Standardized incidence ratio (SIR, with 95% confidence limits), excess absolute risk (EAR) and DCO rate of second primaries for period 1998-2013
FEMALES

Diagnosis		Observed n	Expected n	SIR	LCL 95%	UCL 95%		EAR	DCO %
C16	Stomach	2	0.9	2.1	0.3	7.7		6.5	100.0
C18	Colon	9	2.5	3.6	1.7	6.9	#	39.6	44.4
C19-C20	Rectum	3	1.0	2.9	0.6	8.5		12.0	33.3
C22	Liver	2	0.3	7.3	0.9	26.3		10.5	
C23-C24	Bile	3	0.4	8.0	1.6	23.4	#	16.0	33.3
C25	Pancreas	7	1.1	6.6	2.6	13.6	#	36.1	14.3
C33-C34	Lung	5	1.5	3.4	1.1	7.8	#	21.4	
C50	Breast	2	6.0	0.3	0.0	1.2		-24.5	
C53	Cervix uteri	2	0.3	7.8	0.9	28.3		10.6	50.0
C56	Ovary	8	0.9	8.7	3.8	17.1	#	43.1	25.0
C64	Kidney	3	0.6	5.2	1.1	15.2	#	14.8	
C82-C85	NHL	5	0.9	5.6	1.8	13.1	#	25.0	40.0
Other primaries		5	1.7	2.9	0.9	6.8		19.9	20.0
Not observed		0	4.0	0.0	0.0	0.9	#	-24.4	
All mult. primaries		56	22.1	2.5	1.9	3.3	#	206.5	26.8

Patients	1110
Median age at second malignancy (years)	76.1
Person-years	1643
Mean observation time (years)	1.5
Median observation time (years)	0.6

The occurrence of second malignancy is statistically significant.

Observed second primaries with count 1 are pooled in category "Other primaries".

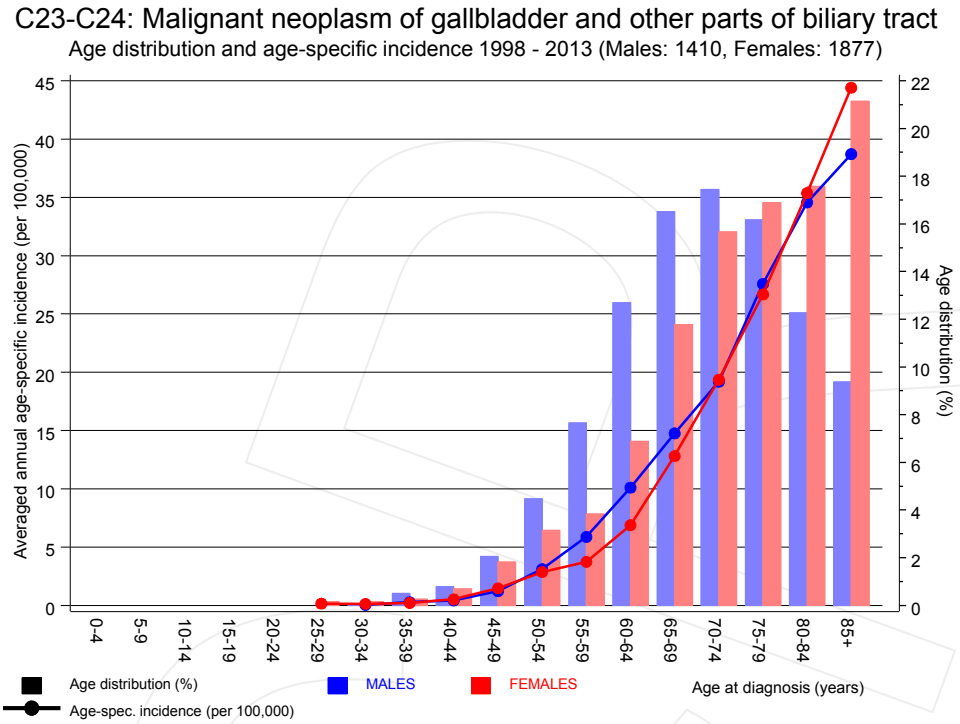


Figure 7. Age distribution and age-specific incidence

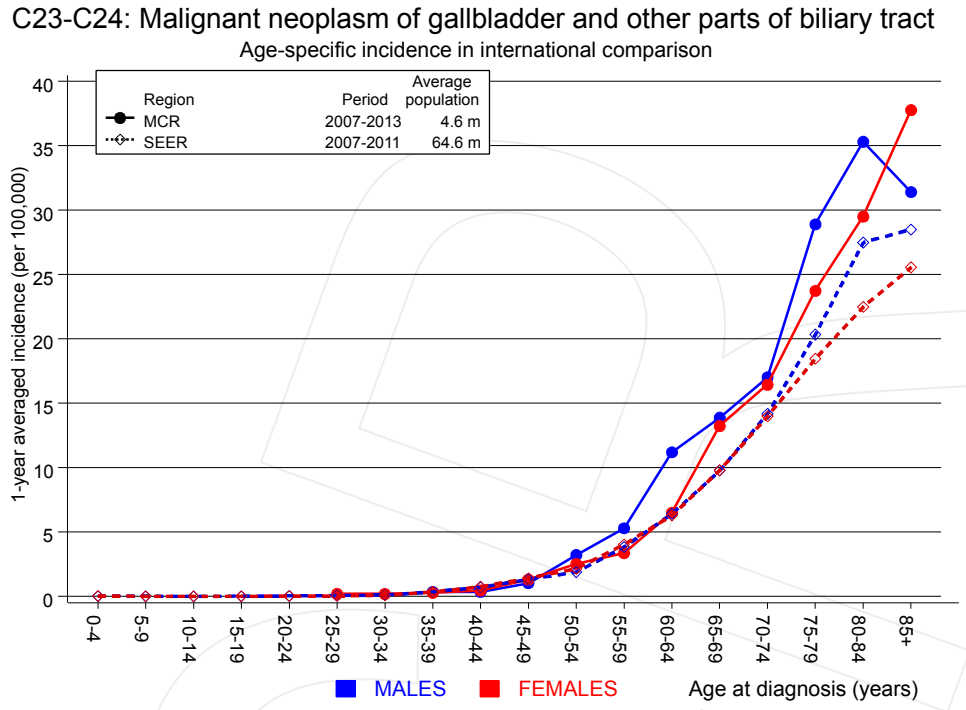


Figure 7a. Age-specific incidence in MCR registry areas compared to SEER (Surveillance, Epidemiology, and End Results, USA).

Reference:

Surveillance, Epidemiology, and End Results (SEER) Program SEER*Stat Database: Incidence - SEER 18 Regs Research Data, released April 2014, based on the November 2013 submission. http://www.seer.cancer.gov.

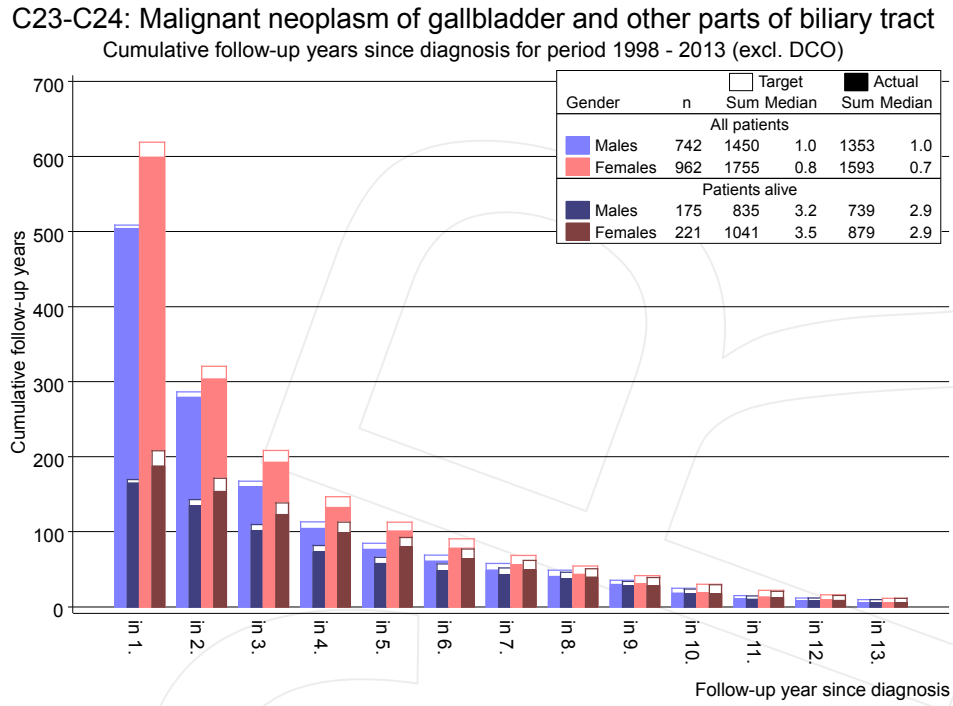
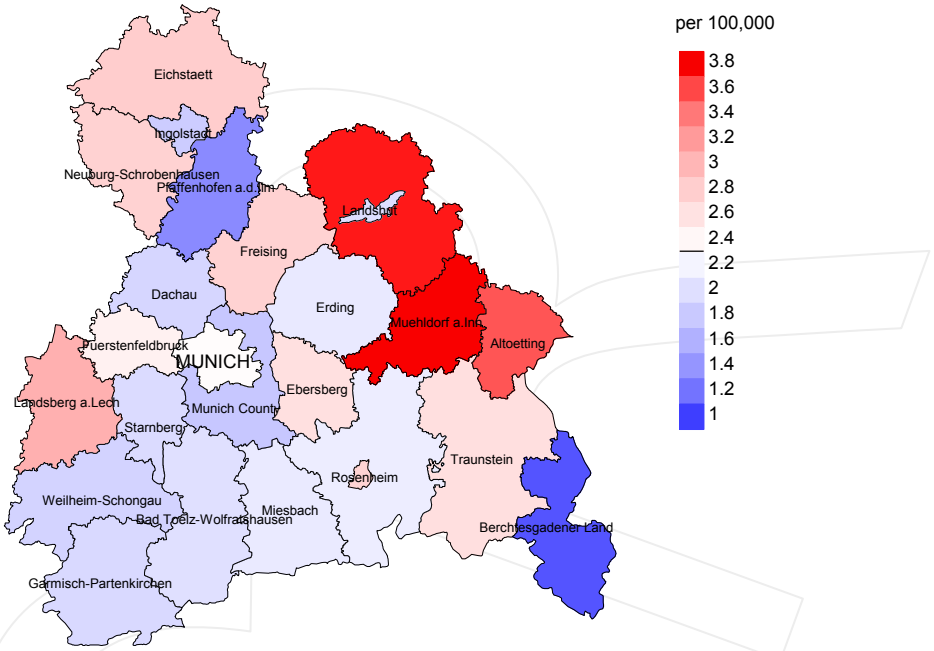


Figure 8. Cumulative follow-up years depending on time since diagnosis

The increase of the lost to follow-up rate can be interpreted as a consequence of a declining number of survivors over time.

Average incidence (world standard population) 2007 - 2013: Males



Average incidence (world standard population) 2007 - 2013: Females

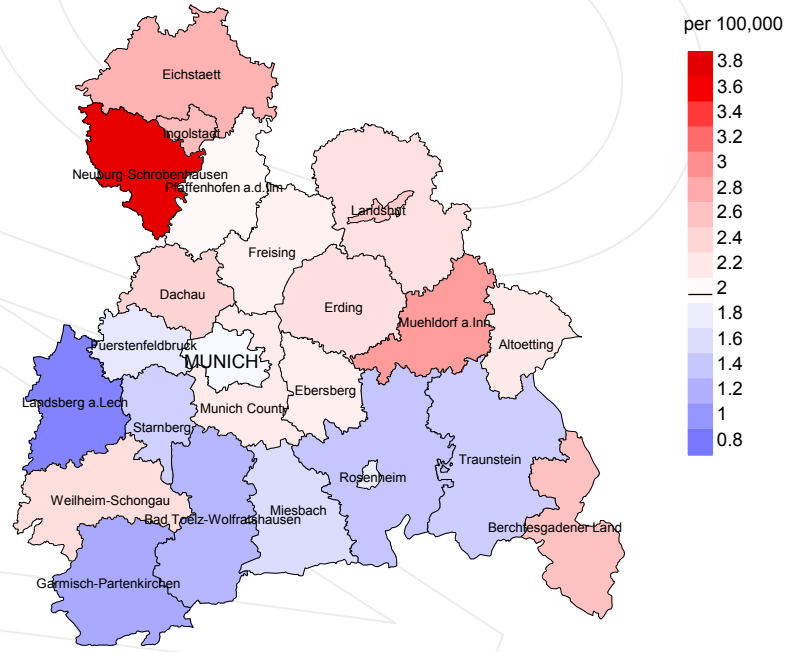
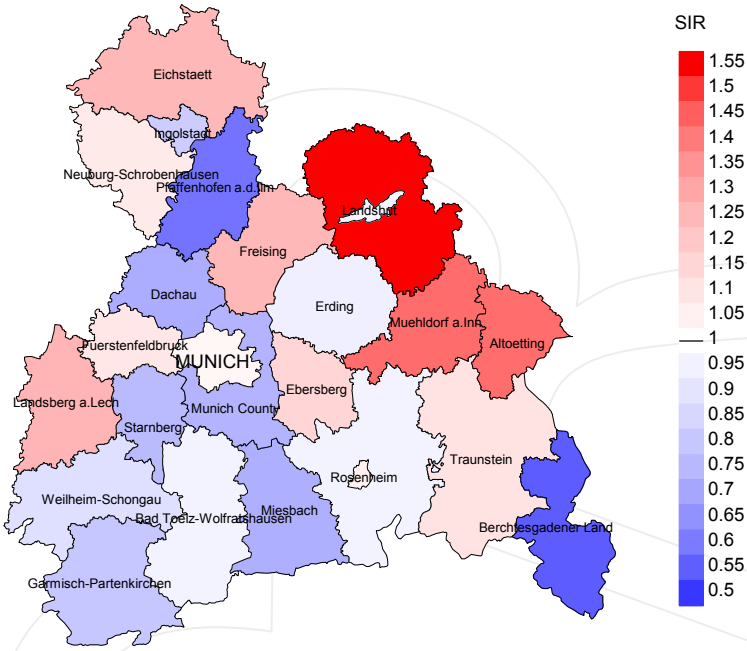


Figure 9a. Map of cancer incidence (world standard population, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual incidence rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 2.3/100,000 WS N=764, females 2.0/100,000 WS N=904).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 20 women were identified with newly diagnosed gallbladder cancer. Therefore, the mean incidence rate for this cancer type in this area can be calculated at 2.1/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 1.0 and 4.0/100,000.

Standardized incidence ratio (SIR) 2007 - 2013: Males



Standardized incidence ratio (SIR) 2007 - 2013: Females

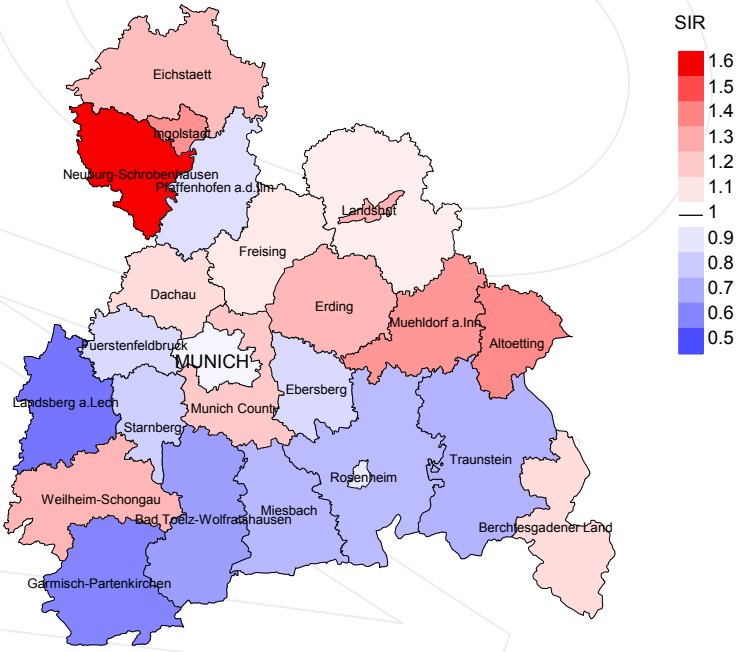


Figure 9b. Map of standardized incidence ratio (SIR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SIR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=764, females N=904).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 20 women were identified with newly diagnosed gallbladder cancer. Therefore, the mean standardized incidence ratio (SIR) for this cancer type in this area can be calculated at 0.85. Though, the value of this parameter may vary with an underlying probability of 99% between 0.44 and 1.48, and is therefore not statistically striking.

MORTALITY

Table 10a

Patient cohorts of incident cancers by year of diagnosis, follow-up status, proportion of DCO, deaths among the annual cohorts, and proportion of available death certificates (with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis	Incident cases n	Prop. actively followed %	Prop. DCO %	Deaths n	Prop. deaths %	Prop. deaths with death certific. %
1998	106	100.0	22.6	97	91.5	93.8
1999	114	100.0	14.9	109	95.6	96.3
2000	114	100.0	23.7	110	96.5	97.3
2001	126	97.6	31.7	115	91.3	96.5
2002	237	100.0	33.8	226	95.4	97.3
2003	229	99.6	31.4	215	93.9	98.1
2004	232	97.0	25.9	204	87.9	98.0
2005	212	98.1	27.4	188	88.7	98.9
2006	250	98.0	21.6	225	90.0	98.7
2007	259	96.1	18.1	236	91.1	98.7
2008	261	91.2	23.0	228	87.4	99.6
2009	255	87.5	16.1	214	83.9	98.6
2010	235	89.4	18.3	193	82.1	98.4
2011	243	88.1	14.4	199	81.9	98.5
2012	243	88.5	11.9	178	73.3	94.9
2013	174	98.9	24.7	91	52.3	91.2
1998-2013	3290	94.9	22.2	2828	86.0	97.7

Table 10b

Annual cohorts of incident cancers and deaths, proportion of death certificates and cases deceased the same year of cancer diagnosis
(incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of diagnosis/ death	Incident cases n	Deaths n	Prop. deaths with death certific. %	Deaths in same year n	Prop. deaths in same year %
1998	106	94	93.6	57	53.8
1999	114	104	94.2	54	47.4
2000	114	122	95.9	62	54.4
2001	126	115	97.4	56	44.4
2002	237	191	99.0	146	61.6
2003	229	148	96.6	115	50.2
2004	232	155	98.7	108	46.6
2005	212	165	97.6	96	45.3
2006	250	202	98.0	126	50.4
2007	259	191	98.4	102	39.4
2008	261	202	98.0	123	47.1
2009	255	208	98.6	100	39.2
2010	235	208	100.0	94	40.0
2011	243	205	99.5	99	40.7
2012	243	229	97.8	105	43.2
2013	174	182	98.9	77	44.3
1998-2013	3290	2721	98.0	1520	46.2

Table 10c

Annual cohorts of deaths, proportion of cancer-related and non-cancer-related deaths, and cancer recorded on death certificates (incl. DCO)
(with respect to registry area expansion from 2.51 to 3.96 m as of 2002, and from 3.96 to 4.64 m as of 2007, respectively)

Year of death	Deaths n	Prop. cancer-related %	Prop. non-cancer-related %	Prop. cancer recorded on death certificate %
1998	94	87.2	12.8	95.5
1999	104	80.8	19.2	94.9
2000	122	91.8	8.2	98.3
2001	115	90.4	9.6	96.4
2002	191	90.6	9.4	93.7
2003	148	89.2	10.8	95.8
2004	155	90.3	9.7	96.1
2005	165	91.5	8.5	95.7
2006	202	87.6	12.4	91.9
2007	191	93.2	6.8	95.7
2008	202	94.6	5.4	96.5
2009	208	88.9	11.1	93.2
2010	208	90.9	9.1	94.7
2011	205	91.2	8.8	95.6
2012	229	86.5	13.5	92.4
2013	182	90.1	9.9	93.9
1998-2013	2721	89.9	10.1	94.8

Table 11a

Medians of age at death according to the grouping in Table 10
MALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	36	75.4	75.2	77.4	75.4
1999	36	73.0	71.3	76.4	71.3
2000	42	75.2	74.8	81.5	75.5
2001	52	72.6	69.8	78.5	73.6
2002	81	71.6	71.4	74.7	71.5
2003	61	72.3	72.2	76.3	73.2
2004	59	73.0	72.8	74.5	72.9
2005	84	70.6	70.0	73.7	70.3
2006	79	72.3	70.9	77.3	72.3
2007	68	68.6	68.2	73.8	69.2
2008	77	72.5	72.1	72.5	71.7
2009	103	71.3	71.1	74.1	71.5
2010	88	74.4	73.9	82.2	74.1
2011	105	74.9	74.9	72.5	74.9
2012	106	74.4	72.8	77.3	73.6
2013	94	75.2	74.3	85.8	74.6
1998-2013	1171	72.9	72.5	76.0	72.8

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 11b

Medians of age at death according to the grouping in Table 10
FEMALES

Year of death	Deaths n	Age at death (all causes) Years	Age at death (cancer-related) Years	Age at death (non-cancer-related) Years	Age at death (according to death certificate) Years
1998	58	76.8	76.1	87.9	76.8
1999	68	77.1	76.9	83.0	77.1
2000	80	78.8	78.3	81.6	79.2
2001	63	78.0	78.0	90.0	78.2
2002	110	79.2	78.6	81.8	78.7
2003	87	77.7	77.4	84.6	77.7
2004	96	78.2	77.9	79.4	78.2
2005	81	78.2	77.4	87.6	77.9
2006	123	79.3	77.7	88.4	77.7
2007	123	76.9	76.4	88.7	76.5
2008	125	77.3	76.8	85.2	77.5
2009	105	80.0	79.2	86.8	79.3
2010	120	79.3	78.9	83.7	78.6
2011	100	78.0	77.6	83.5	77.8
2012	123	77.3	76.8	82.3	76.8
2013	88	79.3	77.2	87.0	79.1
1998-2013	1550	78.1	77.6	85.2	77.9

By 2010, life expectancy for a newborn male in Germany is 77.5 years compared with 82.6 years for his female counterpart.

Deaths of patients are considered to be cancer-related, in case that fact was recorded on the death certificate, or patients had suffered from metastasis or recurrence.

Table 12a

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
MALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	30	2.7	0.81	1.5	0.82	2.5	0.82	3.9	0.86
1999	26	2.3	0.58	1.3	0.57	2.1	0.58	2.7	0.59
2000	39	3.4	0.75	1.9	0.72	3.1	0.77	4.3	0.79
2001	45	3.9	0.94	2.2	0.95	3.5	0.93	4.6	0.88
2002	71	3.8	0.69	2.1	0.67	3.2	0.69	4.3	0.71
2003	54	2.9	0.59	1.5	0.58	2.4	0.59	3.3	0.61
2004	54	2.9	0.66	1.5	0.64	2.4	0.65	3.2	0.67
2005	77	4.1	0.85	2.2	0.85	3.3	0.85	4.2	0.85
2006	69	3.6	0.71	1.8	0.69	2.8	0.71	3.7	0.73
2007	63	2.8	0.61	1.5	0.57	2.1	0.58	2.7	0.58
2008	72	3.2	0.59	1.6	0.60	2.5	0.60	3.4	0.60
2009	92	4.1	0.74	2.0	0.76	3.1	0.75	4.1	0.74
2010	81	3.6	0.78	1.6	0.75	2.6	0.77	3.4	0.76
2011	97	4.2	0.82	1.8	0.77	2.9	0.80	4.1	0.81
2012	92	4.0	0.83	1.9	0.83	2.9	0.85	3.9	0.85
2013	87	3.8	1.10	1.7	1.14	2.7	1.13	3.6	1.09
1998-2013	1049	3.5	0.74	1.7	0.73	2.7	0.74	3.7	0.75

Table 12b

Mortality measures (cancer-related death) and mortality-incidence-index
by year of death
FEMALES

Year of death	Deaths n	Mort. raw	MI-Index raw	Mort. WS	MI-Index WS	Mort. ES	MI-Index ES	Mort. BRD-S	MI-Index BRD-S
1998	52	4.4	0.75	1.8	0.71	2.7	0.74	3.6	0.75
1999	58	4.9	0.84	1.8	0.76	2.8	0.78	3.9	0.80
2000	73	6.1	1.20	2.2	1.34	3.5	1.27	4.9	1.18
2001	59	4.9	0.76	1.7	0.63	2.8	0.69	4.0	0.75
2002	102	5.2	0.76	1.9	0.80	2.9	0.77	4.1	0.76
2003	78	4.0	0.57	1.5	0.59	2.3	0.59	3.2	0.58
2004	86	4.4	0.57	1.5	0.54	2.4	0.56	3.4	0.58
2005	74	3.7	0.61	1.3	0.56	2.0	0.57	2.9	0.62
2006	108	5.4	0.71	1.8	0.72	2.9	0.71	4.0	0.71
2007	115	5.0	0.74	1.7	0.69	2.8	0.71	3.8	0.74
2008	119	5.1	0.86	1.8	0.84	2.8	0.86	3.8	0.89
2009	93	4.0	0.72	1.2	0.59	2.0	0.65	2.9	0.71
2010	108	4.6	0.82	1.6	0.77	2.5	0.79	3.3	0.79
2011	90	3.8	0.73	1.4	0.76	2.1	0.73	2.8	0.73
2012	106	4.5	0.81	1.5	0.75	2.4	0.78	3.3	0.78
2013	77	3.3	0.81	1.1	0.78	1.7	0.78	2.4	0.80
1998-2013	1398	4.5	0.74	1.5	0.72	2.5	0.73	3.4	0.74

Table 13

Age distribution of age at death (cancer-related) for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Cases n	%	Cum.%	Males n	%	Cum.%	Females n	%	Cum.%
25-29	3	0.1	0.1			0.0	3	0.2	0.2
30-34	2	0.1	0.2	1	0.1	0.1	1	0.1	0.3
35-39	6	0.2	0.4	2	0.2	0.3	4	0.3	0.6
40-44	11	0.4	0.9	7	0.7	1.0	4	0.3	0.9
45-49	39	1.6	2.5	12	1.1	2.1	27	1.9	2.8
50-54	78	3.2	5.7	45	4.3	6.4	33	2.4	5.1
55-59	144	5.9	11.5	82	7.8	14.2	62	4.4	9.6
60-64	200	8.2	19.7	120	11.4	25.6	80	5.7	15.3
65-69	312	12.7	32.4	163	15.5	41.1	149	10.6	25.9
70-74	401	16.4	48.8	192	18.3	59.4	209	14.9	40.8
75-79	436	17.8	66.6	174	16.6	75.9	262	18.7	59.5
80-84	388	15.8	82.4	130	12.4	88.3	258	18.4	77.9
85+	432	17.6	100.0	123	11.7	100.0	309	22.1	100.0
All ages	2452	100.0		1051	100.0		1401	100.0	

Included in the statistics are 23.4% multiple primaries in males and 20.1% in females.

Table 14

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**incl. multiple primaries**)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29		3	0.0		0.1	1.00		2.6
30-34	1	1	0.0	1.00	0.0	0.33	0.5	0.4
35-39	2	4	0.1	0.29	0.2	0.80	0.5	0.8
40-44	7	4	0.3	0.64	0.2	0.31	0.8	0.4
45-49	12	27	0.5	0.41	1.2	0.79	0.7	1.3
50-54	45	33	2.2	0.71	1.6	0.56	1.4	1.1
55-59	82	62	4.5	0.76	3.2	0.86	1.4	1.3
60-64	120	80	6.8	0.67	4.3	0.62	1.3	1.2
65-69	163	149	10.3	0.70	8.6	0.67	1.4	1.8
70-74	192	209	15.0	0.78	13.8	0.71	1.4	2.1
75-79	174	262	21.1	0.76	22.1	0.82	1.3	2.4
80-84	130	258	26.0	0.75	27.7	0.78	1.2	2.3
85+	123	309	36.1	0.92	34.6	0.78	1.4	2.3
All ages	1051	1401					1.3	1.9
Mortality								
Raw			3.5	0.74	4.5	0.75		
WS			1.7	0.73	1.6	0.72		
ES			2.7	0.74	2.5	0.73		
BRD-S			3.7	0.75	3.4	0.74		
PYLL-70								
per 100,000			13.8		12.6			
ES			12.1		10.7			
AYLL-70			8.5		9.2			

The rates underestimate the prognosis if other synchronous cancers are prognostic unfavorable.

Table 15a

Multiple primaries in deaths in period 1998-2013
MALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C15	Oesophagus	3	1.2	1	33.3	1	33.3	1	33.3
C16	Stomach	11	4.5	7	63.6	2	18.2	2	18.2
C17	Small intestine	3	1.2	1	33.3	1	33.3	1	33.3
C18	Colon	25	10.2	17	68.0	5	20.0	3	12.0
C19-C20	Rectum	14	5.7	13	92.9	1	7.1		
C22	Liver	4	1.6	1	25.0	2	50.0	1	25.0
C23-C24	Bile	4	1.6			1	25.0	3	75.0
C25	Pancreas	7	2.8			3	42.9	4	57.1
C32	Larynx	5	2.0	4	80.0	1	20.0		
C33-C34	Lung	11	4.5	3	27.3	2	18.2	6	54.5
C43	Malign. melanoma	9	3.7	6	66.7			3	33.3
C44	Skin others	12	4.9	7	58.3	1	8.3	4	33.3
C61	Prostate	64	26.0	51	79.7	4	6.3	9	14.1
C62	Testis	5	2.0	5	100.0				
C64	Kidney	13	5.3	10	76.9	1	7.7	2	15.4
C67	Bladder	18	7.3	13	72.2	3	16.7	2	11.1
C70-C72	CNS cancer	3	1.2	2	66.7	1	33.3		
C76-C79	CUP	4	1.6	2	50.0	2	50.0		
C82-C85	NHL	6	2.4	3	50.0	1	16.7	2	33.3
C90	Mult. myeloma	4	1.6	1	25.0			3	75.0
Other primaries		21	8.5	11	52.4	4	19.0	6	28.6
All mult. primaries		246	100.0	158	64.2	36	14.6	52	21.1

Multiple primaries with number of cases 1 to 2 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 15b

Multiple primaries in deaths in period 1998-2013
FEMALES

Diagnosis		Total n	Total %↓	Pre n	Pre ←%	Syn-chron ±30d n	Syn-chron ±30d ←%	Post n	Post ←%
C03-C06	Oral cavity	3	1.1	3	100.0				
C16	Stomach	6	2.2	1	16.7	1	16.7	4	66.7
C18	Colon	30	11.1	17	56.7	4	13.3	9	30.0
C19-C20	Rectum	13	4.8	8	61.5	3	23.1	2	15.4
C22	Liver	3	1.1	1	33.3	1	33.3	1	33.3
C23-C24	Bile	3	1.1					3	100.0
C25	Pancreas	7	2.6	2	28.6	4	57.1	1	14.3
C33-C34	Lung	10	3.7	3	30.0	2	20.0	5	50.0
C43	Malign. melanoma	11	4.1	10	90.9			1	9.1
C44	Skin others	11	4.1	7	63.6	3	27.3	1	9.1
C50	Breast	69	25.6	66	95.7	2	2.9	1	1.4
C51	Vulva	3	1.1	3	100.0				
C53	Cervix uteri	6	2.2	4	66.7			2	33.3
C54	Corpus uteri	18	6.7	18	100.0				
C56	Ovary	16	5.9	5	31.3	3	18.8	8	50.0
C64	Kidney	11	4.1	8	72.7	3	27.3		
C67	Bladder	10	3.7	9	90.0			1	10.0
C70-C72	CNS cancer	4	1.5	2	50.0	2	50.0		
C76-C79	CUP	5	1.9	2	40.0	2	40.0	1	20.0
C82-C85	NHL	10	3.7	7	70.0	2	20.0	1	10.0
C91-C96	Leukaemia	3	1.1	2	66.7			1	33.3
Other primaries		18	6.7	11	61.1	5	27.8	2	11.1
All mult. primaries		270	100.0	189	70.0	37	13.7	44	16.3

Multiple primaries with number of cases 1 to 2 are pooled in category "Other primaries".

ICD-10 C44 (Other malignant neoplasms of skin) is not systematically recorded by MCR and therefore not considered for evaluation as a particular primary but at least as a multiple malignancy.

Table 16

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Singular primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29		3	0.0		0.1	1.00		2.8
30-34	1	1	0.0	1.00	0.0	0.33	0.6	0.5
35-39	2	4	0.1	0.40	0.2	0.80	0.5	0.9
40-44	7	4	0.3	0.70	0.2	0.31	0.9	0.4
45-49	12	26	0.5	0.43	1.1	0.79	0.7	1.5
50-54	42	30	2.1	0.74	1.5	0.55	1.5	1.2
55-59	74	55	4.0	0.77	2.9	0.90	1.4	1.4
60-64	97	69	5.5	0.63	3.7	0.59	1.3	1.3
65-69	146	125	9.2	0.71	7.2	0.69	1.5	1.9
70-74	160	175	12.5	0.80	11.5	0.73	1.5	2.2
75-79	144	219	17.4	0.79	18.4	0.82	1.4	2.6
80-84	103	211	20.6	0.77	22.6	0.77	1.3	2.4
85+	89	278	26.1	0.87	31.1	0.81	1.3	2.5
All ages	877	1200					1.4	2.0
Mortality								
Raw			2.9	0.75	3.9	0.75		
WS			1.5	0.73	1.3	0.72		
ES			2.3	0.74	2.1	0.73		
BRD-S			3.0	0.75	2.9	0.75		
PYLL-70								
per 100,000			12.4		11.4			
ES			10.9		9.7			
AYLL-70			8.7		9.6			

* See corresponding tables with multiple primaries.

Table 17

Age-specific mortality (cancer-related) and proportion of all cancers
for period 1998-2013
(**Single primaries only** *)

Age at death Years	Males n	Females n	Males Age-spec. mortal.	MI-index	Females Age-spec. mortal.	MI-index	Males Prop.all cancers %	Females Prop.all cancers %
0- 4			0.0		0.0			
5- 9			0.0		0.0			
10-14			0.0		0.0			
15-19			0.0		0.0			
20-24			0.0		0.0			
25-29		3	0.0		0.1	1.00		2.9
30-34	1	1	0.0	1.00	0.0	0.33	0.6	0.5
35-39	2	4	0.1	0.40	0.2	0.80	0.6	0.9
40-44	7	3	0.3	0.78	0.1	0.23	0.9	0.3
45-49	12	26	0.5	0.46	1.1	0.79	0.8	1.7
50-54	37	29	1.8	0.65	1.4	0.55	1.4	1.2
55-59	72	51	3.9	0.78	2.7	0.88	1.6	1.4
60-64	93	69	5.2	0.63	3.7	0.61	1.4	1.5
65-69	143	123	9.1	0.72	7.1	0.69	1.7	2.2
70-74	152	170	11.9	0.79	11.2	0.74	1.7	2.6
75-79	137	208	16.6	0.77	17.5	0.81	1.7	2.9
80-84	100	205	20.0	0.76	22.0	0.76	1.6	2.8
85+	86	273	25.2	0.86	30.5	0.81	1.6	2.9
All ages	842	1165					1.6	2.3
Mortality								
Raw			2.8	0.74	3.8	0.75		
WS			1.4	0.73	1.3	0.72		
ES			2.2	0.74	2.1	0.73		
BRD-S			2.9	0.75	2.8	0.74		
PYLL-70								
per 100,000			11.8		11.1			
ES			10.4		9.4			
AYLL-70			8.6		9.5			

* See corresponding tables with multiple primaries.

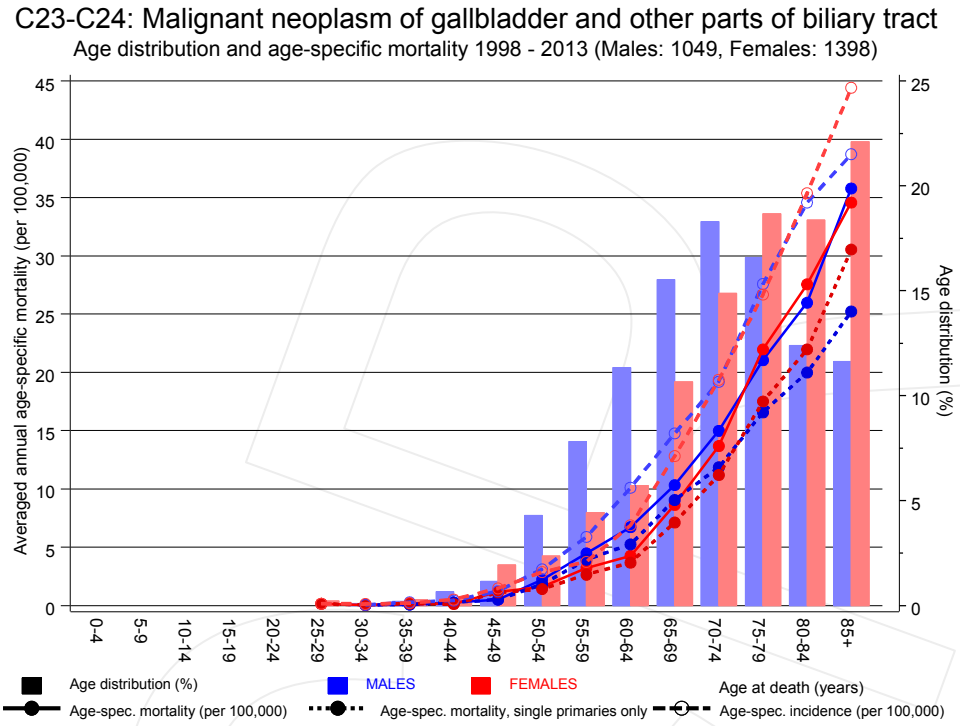
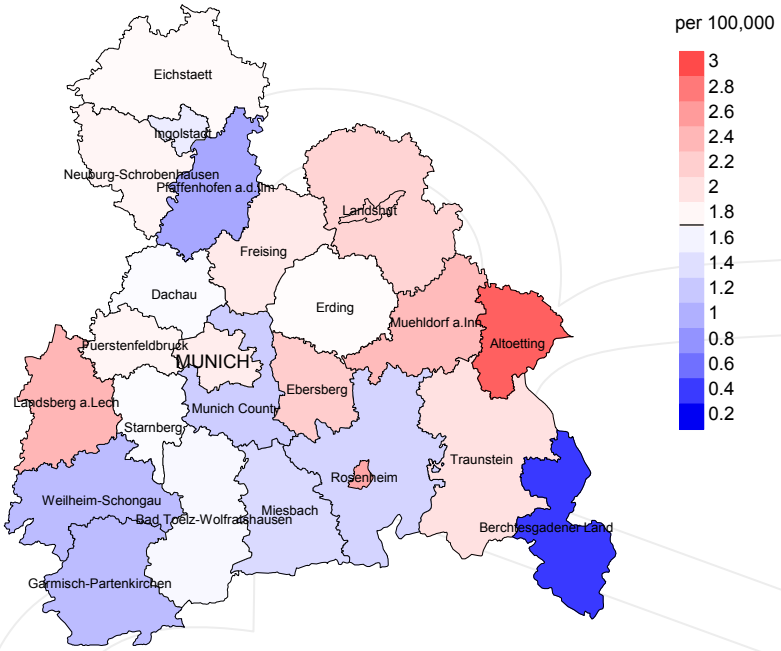


Figure 18. Distribution of age at death (bars) and age-specific mortality (all patients: solid line, patients with single primaries: dotted line). The age-specific incidence is additionally plotted for comparison (dashed line).

The difference between age at diagnosis (Table 3) and age at gallbladder cancer-related death (see Table 10) should be considered.

Average mortality (world standard population) 2007 - 2013: Males



Average mortality (world standard population) 2007 - 2013: Females

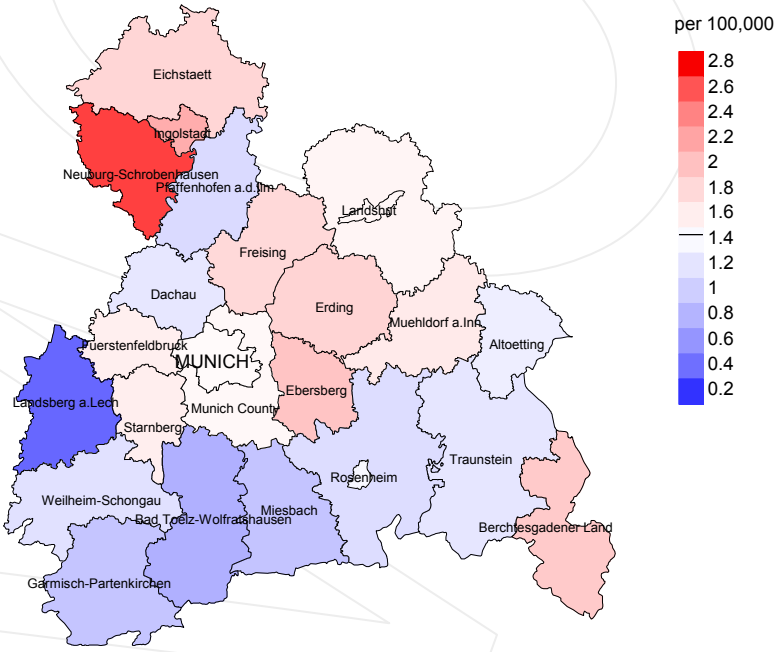
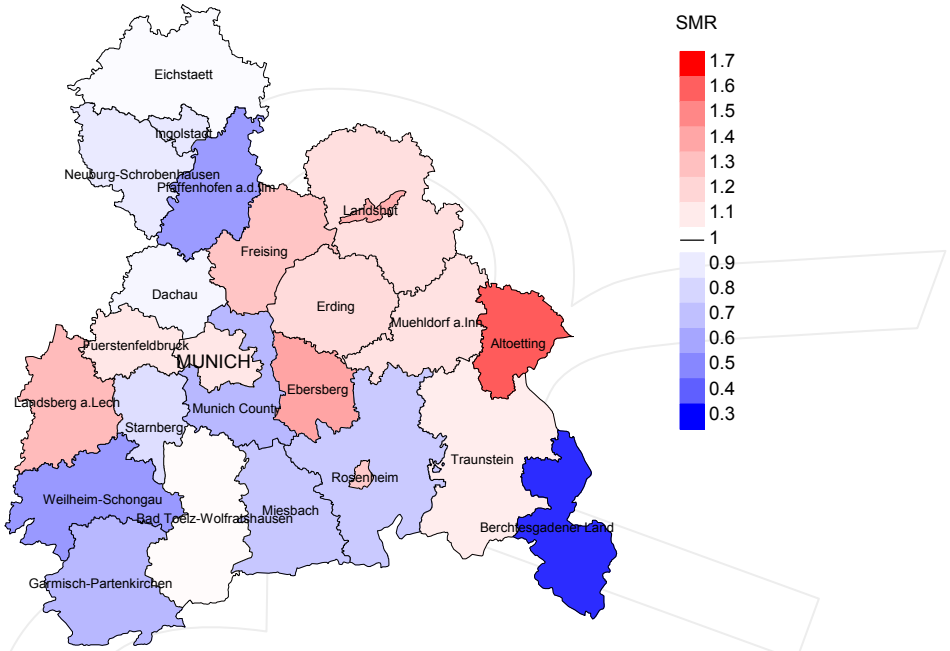


Figure 19a. Map of cancer mortality (world standard population) by county averaged for period 2007 to 2013. According to their individual mortality rates, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population mean (males 1.7/100,000 WS N=579, females 1.4/100,000 WS N=704).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,928 female residents (averaged) in the period from 2007 to 2013 a total of 20 women died from gallbladder cancer. Therefore, the mean mortality rate for this cancer type in this area can be calculated at 2.0/100,000 (world standard population). Though, the value of this parameter may vary with an underlying probability of 99% between 0.9 and 3.7/100,000.

Standardized mortality ratio (SMR) 2007 - 2013: Males



Standardized mortality ratio (SMR) 2007 - 2013: Females

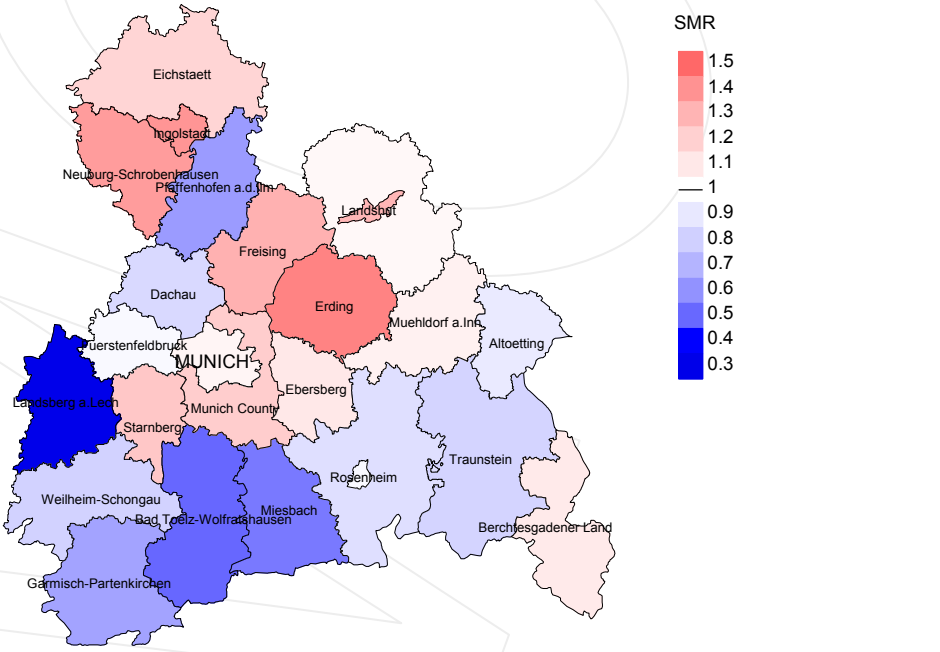


Figure 19b. Map of standardized mortality ratio (SMR, incl. DCO cases) by county averaged for period 2007 to 2013. According to their individual SMR values, the counties are displayed in different red and blue color temperatures where the fine white color indicates the population overall of 1.0 (males N=579, females N=704).

The results should be interpreted with caution! E.g., in county Ebersberg with a population of 64,642 female residents (averaged) in the period from 2007 to 2013 a total of 20 women died from gallbladder cancer. Therefore, the mean standardized mortality ratio (SMR) for this cancer type in this area can be calculated at 1.10. Though, the value of this parameter may vary with an underlying probability of 99% between 0.57 and 1.91, and is therefore not statistically striking.

Statistical Notes

In all tables and figures the respective reference values should be carefully considered. The incidence rates include diagnoses (with multiple primary), and death certificate only (DCO) cases. For mortality statistics patients, diagnoses and progressive course of disease are presented. In the calculations, all courses of disease are considered whereby progressions occurred and/or death certificate identified progressive cancers were ascertained. Additionally there are three groups of disease course to consider:

1. **All multiple primaries included**

   The mortality statistic describes the tumor-specific death, independent of any malignancy. The patient perspective, induced secondary malignancies, and the problem of multiple malignancies from the same primary tumor all have reasons for their inclusion.

2. **First singular primary** (no information about other prior or synchronous malignancy)

   The mortality statistic describes the cancer-related death for patients who have no therapeutic restrictions due to a previous or synchronous cancer. These statistics are comparable to studies that have exclusion criteria based on a second malignancy.

3. **Single primary** (no information about other prior, syn- or metachronous malignancy)

   The mortality statistic describes the tumor-specific death that occurs without any impact through secondary primaries, earlier, synchronous, later or induced. Precisely the difference between disease group 1 and 2 highlight the magnitude of the problem of secondary malignancies.

For this reason differences appear concerning official mono-causal mortality statistics. To judge the maximum deviation, 2 further tables are presented. In the first table the distribution of secondary malignancies before, at or after the described cancer are shown, that could be an alternative cause of death. In the second table, the age-specific mortality rates for all courses of disease, without designation of secondary malignancies are shown.

A previously minimally acknowledged statistic is the **age at death**, which allows for a good assessment of the quality of classification of the apparent tumor-specific death. For assumed tumor-independent deaths, the age of death should be estimated from the age of diagnosis and the normal life expectancy, whereas tumor-dependent deaths can be estimated from the age of diagnosis plus the average tumor-specific life expectancy. The comparison of different tumors demonstrates this association, if the causes of cancer and the competing cause of death are independent of each other (e.g. breast and colon versus head/neck and lung).

The index from mortality and incidence (Mortality-Incidence ratio, **MI-index**) is a statistic that allows for the evaluation of the quality of data. For diseases with poor prognoses, comparable values are obtained from all age groups, because to a large extent, the numerator and denominator contain the same cases. For tumors with a good prognosis, increasing and decreasing incidence and age-specific differences in prognosis can more strongly alter the MI- index. Additionally, attention should be paid to the confidence intervals where fewer cases are reported.

The complexity of problems identified here emphasizes the importance of relative survival data for the appropriate analysis of long term results.

As a measurement of the burden of disease, the number of potential life years loss due to premature deaths in a cohort can be calculated (**PYLL**, potential years of life lost, standardized per 100,000 persons or per European standard) as well as the average loss of life years per individual (**AYLL**, average years of life lost). Depending upon the analytic aim (health economy, prevention, health care research) different methods exist for the generation of these measurements. In the results presented here, the age for a premature death is considered to be before 70 years, according to the guidelines of the OECD and the WHO (as seen in the abbreviation PYLL-70 or AYLL-70).

Shortcuts

FRG	Federal Republic of Germany
GEKID	Association of Population-based Cancer Registries in Germany (Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V.)
MCR	Munich Cancer Registry (Tumorregister München)
SEER	Surveillance, Epidemiology, and End Results (USA)
AYLL-70	Average years of life lost prior to age 70 given a person dies before that age
BRD-S	German standard population
DCO	Death certificate only
EAR	Excess absolute risk = excess cancer cases (O - E) per 10,000 person-years
ES	European standard population (old)
LCL	Lower confidence limit
MI-index	Ratio between mortality and incidence
PYLL-70	Potential years of life lost prior to age 70 given a person dies before that age
SIR	Standardized incidence ratio
SMR	Standardized mortality ratio
UCL	Upper confidence limit
WS	World standard population

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